

CLAIMS

What is claimed is:

1. An apparatus for producing shock wave aerosolization, comprising:
a source of compressed gas;
a nozzle; and
means associated with said nozzle for generating a supersonic jet of gas from
said source of compressed gas.

2. An apparatus as recited in claim 1, further comprising a sonic shock
chamber configured for receiving said supersonic jet of gas.

3. An apparatus as recited in claim 1, further comprising:
a user actuated valve; and
means for releasing said compressed gas in bursts by said valve and
delivering said supersonic jet of gas to said shock chamber.

4. An apparatus as recited in claim 1, further comprising:
means for delivering a burst of compressed gas to said nozzle and forming
said supersonic jet prior to liquid being entrained and mixed with said jet.

5. An apparatus as recited in claim 3, further comprising:
a cartridge containing said nozzle and a blister pack containing medication for
one aerosol treatment.

6. An apparatus as recited in claim 5, wherein said cartridge is
disposable.

7. An apparatus as recited in claim 5, further comprising:
an actuator handle coupled to said actuator valve;

wherein said actuator handle is configured to receive said cartridge.

8. An apparatus as recited in claim 7, wherein insertion of said cartridge into said actuator handle causes said nozzle to be sealed with an outlet passage of said compressed gas source upon actuation of the actuator handle.

9. An apparatus as recited in claim 7, wherein insertion of said cartridge into said actuator handle causes said blister pack to be punctured.

10. An apparatus as recited in claim 7, wherein medication in said blister pack is entrained and aerosolized by said nozzle upon actuation of said actuator handle.

11. An apparatus for producing shock wave aerosolization, comprising:
a source of compressed gas;
a nozzle;
means associated with said nozzle for generating a supersonic jet of gas from said source of compressed gas; and
a sonic shock chamber configured for receiving said supersonic jet of gas.

12. An apparatus as recited in claim 11, further comprising:
a user actuated valve; and
means for releasing said compressed gas in bursts by said valve and delivering said supersonic jet of gas to said shock chamber.

13. An apparatus as recited in claim 12, further comprising:
means for delivering a burst of compressed gas to said nozzle and forming said supersonic jet prior to liquid being entrained and mixed with said jet.

14. An apparatus as recited in claim 13, further comprising:
a cartridge containing said nozzle and a blister pack containing medication for

one aerosol treatment.

15. An apparatus as recited in claim 14, wherein said cartridge is disposable.

16. An apparatus as recited in claim 15, further comprising:
an actuator handle coupled to said actuator valve;
wherein said actuator handle is configured to receive said cartridge.

17. An apparatus as recited in claim 16, wherein insertion of said cartridge into said actuator handle causes said nozzle to be sealed with an outlet passage of said compressed gas source upon actuation of the actuator handle.

18. An apparatus as recited in claim 16, wherein insertion of said cartridge into said actuator handle causes said blister pack to be punctured.

19. An apparatus as recited in claim 16, wherein medication in said blister pack is entrained and aerosolized by said nozzle upon actuation of said actuator handle.

20. An inhaler apparatus, comprising:
a reservoir for containing compressed gas;
a supersonic shock nozzle; and
a user actuated valve configured to release said compressed gas in bursts for delivery to said supersonic shock nozzle.

21. An apparatus as recited in claim 20, wherein said supersonic shock nozzle comprises:
a jet orifice configured to receive compressed gas from said reservoir; and
a sonic shock chamber configured to receive compressed gas discharged from said jet orifice.

22. An apparatus as recited in claim 21:
wherein said jet orifice is configured to produce a supersonic jet from said compressed gas; and
wherein said shock chamber is configured to receive said supersonic jet and produce shock waves.

23. An apparatus as recited in claim 22, wherein if said supersonic jet is over expanded or under expanded, said supersonic jet will establish a series of reflected compression and expansion shock waves in said shock chamber.

24. An apparatus as recited in claim 23, wherein said supersonic jet will be approximately the diameter of the jet orifice and travel down the axis of the shock chamber.

25. An apparatus as recited in claim 22, wherein if said supersonic jet is perfectly expanded, a cylindrical shock wave will be generated in said shock chamber that envelopes the entire jet.

26. An apparatus as recited in claim 22, wherein upon formation of said supersonic jet and resulting shock waves in said shock chamber, a vacuum is generated which causes liquid from a liquid reservoir to be entrained through a liquid feed into said shock chamber.

27. An apparatus as recited in claim 26, wherein upon entrainment of liquid into the shock chamber, the initial liquid entrained comes in contact with shock waves, producing copious amounts of aerosol particles suitable for inhalation.

28. An apparatus as recited in claim 27, wherein once liquid has been entrained into the shock chamber and supersonic jet, the integrity of the supersonic jet and resulting reflecting shock waves is destroyed, resulting in less subsequent production of aerosol particles than the initial burst and generally a larger particle

size.

29. An apparatus as recited in claim 20, further comprising:
a cartridge containing said supersonic shock nozzle and a blister pack
containing medication for one aerosol treatment.

30. An apparatus as recited in claim 29, wherein said cartridge is
disposable.

31. An apparatus as recited in claim 29, further comprising:
an actuator handle coupled to said actuator valve;
wherein said actuator handle is configured to receive said cartridge.

32. An apparatus as recited in claim 31, wherein insertion of said cartridge
into said actuator handle causes said nozzle to be sealed with an outlet passage of
said reservoir containing compressed gas upon actuation of the actuator handle.

33. An apparatus as recited in claim 31, wherein insertion of said cartridge
into said actuator handle causes said blister pack to be punctured.

34. An apparatus as recited in claim 31, wherein medication in said blister
pack is entrained and aerosolized by said nozzle upon actuation of said actuator
handle.

35. An inhaler apparatus, comprising:
a reservoir for containing compressed gas;
a jet orifice configured to receive compressed gas from said reservoir;
a sonic shock chamber configured to receive compressed gas discharged
from said jet orifice; and
a user actuated valve configured to release said compressed gas in bursts for
delivery to said supersonic shock nozzle.

36. An apparatus as recited in claim 35:
wherein said jet orifice is configured to produce a supersonic jet from said compressed gas; and
wherein said shock chamber is configured to receive said supersonic jet and produce shock waves.

37. An apparatus as recited in claim 36, wherein if said supersonic jet is over expanded or under expanded, said supersonic jet will establish a series of reflected compression and expansion shock waves in said shock chamber.

38. An apparatus as recited in claim 37, wherein said supersonic jet will be approximately the diameter of the jet orifice and travel down the axis of the shock chamber.

39. An apparatus as recited in claim 36, wherein if said supersonic jet is perfectly expanded, a cylindrical shock wave will be generated in said shock chamber that envelopes the entire jet.

40. An apparatus as recited in claim 36, wherein upon formation of said supersonic jet and resulting shock waves in said shock chamber, a vacuum is generated which causes liquid from a liquid reservoir to be entrained through a liquid feed into said shock chamber.

41. An apparatus as recited in claim 40, wherein upon entrainment of liquid into the shock chamber, the initial liquid entrained comes in contact with shock waves, producing copious amounts of aerosol particles suitable for inhalation.

42. An apparatus as recited in claim 41, wherein once liquid has been entrained into the shock chamber and supersonic jet, the integrity of the supersonic jet and resulting reflecting shock waves is destroyed, resulting in less subsequent production of aerosol particles than the initial burst and generally a larger particle size.

43. An apparatus as recited in claim 35, further comprising:
a cartridge containing said supersonic shock nozzle and a blister pack
containing medication for one aerosol treatment.

44. An apparatus as recited in claim 43, wherein said cartridge is
disposable.

45. An apparatus as recited in claim 43, further comprising:
an actuator handle coupled to said actuator valve;
wherein said actuator handle is configured to receive said cartridge.

46. An apparatus as recited in claim 45, wherein insertion of said cartridge
into said actuator handle causes said nozzle to be sealed with an outlet passage of
said reservoir containing compressed gas upon actuation of the actuator handle.

47. An apparatus as recited in claim 45, wherein insertion of said cartridge
into said actuator handle causes said blister pack to be punctured.

48. An apparatus as recited in claim 45, wherein medication in said blister
pack is entrained and aerosolized by said nozzle upon actuation of said actuator
handle.

49. An inhaler apparatus, comprising:
a reservoir for containing compressed gas;
a jet orifice configured to receive compressed gas from said reservoir and
produce a supersonic jet;
a sonic shock chamber configured to receive said supersonic jet and produce
shock waves; and
a user actuated valve configured to release said compressed gas in bursts for
delivery to said supersonic shock nozzle.

50. An apparatus as recited in claim 49, wherein if said supersonic jet is over expanded or under expanded, said supersonic jet will establish a series of reflected compression and expansion shock waves in said shock chamber.

51. An apparatus as recited in claim 50, wherein said supersonic jet will be approximately the diameter of the jet orifice and travel down the axis of the shock chamber.

52. An apparatus as recited in claim 49, wherein if said supersonic jet is perfectly expanded, a cylindrical shock wave will be generated in said shock chamber that envelopes the entire jet.

53. An apparatus as recited in claim 49, wherein upon formation of said supersonic jet and resulting shock waves in said shock chamber, a vacuum is generated which causes liquid from a liquid reservoir to be entrained through a liquid feed into said shock chamber.

54. An apparatus as recited in claim 53, wherein upon entrainment of liquid into the shock chamber, the initial liquid entrained comes in contact with shock waves, producing copious amounts of aerosol particles suitable for inhalation.

55. An apparatus as recited in claim 54, wherein once liquid has been entrained into the shock chamber and supersonic jet, the integrity of the supersonic jet and resulting reflecting shock waves is destroyed, resulting in less subsequent production of aerosol particles than the initial burst and generally a larger particle size.

56. An apparatus as recited in claim 49, further comprising:
a cartridge containing said jet orifice, said shock chamber, and a blister pack containing medication for one aerosol treatment.

57. An apparatus as recited in claim 56, wherein said cartridge is disposable.

58. An apparatus as recited in claim 56, further comprising:
an actuator handle coupled to said actuator valve;
wherein said actuator handle is configured to receive said cartridge.

59. An apparatus as recited in claim 58, wherein insertion of said cartridge into said actuator handle causes said nozzle to be sealed with an outlet passage of said reservoir containing compressed gas upon actuation of the actuator handle.

60. An apparatus as recited in claim 58, wherein insertion of said cartridge into said actuator handle causes said blister pack to be punctured.

61. An apparatus as recited in claim 58, wherein medication in said blister pack is entrained and aerosolized by said nozzle upon actuation of said actuator handle.

62. An inhaler apparatus, comprising:
a reservoir for containing compressed gas;
a jet orifice configured to receive compressed gas from said reservoir and produce a supersonic jet;
a sonic shock chamber configured to receive said supersonic jet and produce shock waves;
a valve configured to release said compressed gas in bursts for delivery to said supersonic shock nozzle; and
an actuator handle coupled to said valve.

63. An apparatus as recited in claim 62, wherein if said supersonic jet is over expanded or under expanded, said supersonic jet will establish a series of reflected compression and expansion shock waves in said shock chamber.

64. An apparatus as recited in claim 63, wherein said supersonic jet will be approximately the diameter of the jet orifice and travel down the axis of the shock chamber.

65. An apparatus as recited in claim 62, wherein if said supersonic jet is perfectly expanded, a cylindrical shock wave will be generated in said shock chamber that envelopes the entire jet.

66. An apparatus as recited in claim 62, wherein upon formation of said supersonic jet and resulting shock waves in said shock chamber, a vacuum is generated which causes liquid from a liquid reservoir to be entrained through a liquid feed into said shock chamber.

67. An apparatus as recited in claim 66, wherein upon entrainment of liquid into the shock chamber, the initial liquid entrained comes in contact with shock waves, producing copious amounts of aerosol particles suitable for inhalation.

68. An apparatus as recited in claim 67, wherein once liquid has been entrained into the shock chamber and supersonic jet, the integrity of the supersonic jet and resulting reflecting shock waves is destroyed, resulting in less subsequent production of aerosol particles than the initial burst and generally a larger particle size.

69. An apparatus as recited in claim 62, further comprising:
a cartridge containing said jet orifice, said shock chamber, and a blister pack containing medication for one aerosol treatment.

70. An apparatus as recited in claim 69, wherein said cartridge is disposable.

71. An apparatus as recited in claim 69, wherein said actuator handle is

configured to receive said cartridge.

72. An apparatus as recited in claim 71, wherein insertion of said cartridge into said actuator handle causes said nozzle to be sealed with an outlet passage of said reservoir containing compressed gas upon actuation of the actuator handle.

73. An apparatus as recited in claim 71, wherein insertion of said cartridge into said actuator handle causes said blister pack to be punctured.

74. An apparatus as recited in claim 71, wherein medication in said blister pack is entrained and aerosolized by said nozzle upon actuation of said actuator handle.